EXHIBIT 57
REDACTED

Dynamic Pricing for AdX

Status: draft (as of 2/06/2013)

The purpose of this document is to collate ideas about dynamic pricing. This document should not be viewed as a sales pitch, but instead a forum where we can address criticism levelled against this idea and discuss alternate approaches.

The current Adx auction is based on a second price auction with a fixed reserve price that is supplied by the publisher. There is tremendous room for improvement here as evidenced by the fact that ███[1]. So if we were to assume that the bidders are bidding their real valuations, then on an average we only make ████████████ that we could have otherwise made had they been charged their bid. Of course we can't convert the auction to a first price auction as this would incentivise buyers to shade their bids. Enter, Reserve Price Optimization (RPO).

The idea behind RPO is to provide reserve price recommendations to publishers to better monetize their inventory. In the current framework these recommendations are made by analyzing ████████████ ███████████████████████. This is surfaced in the UI where the publisher _may choose_ to set the reserve price based on these recommendations. There is also an auto updater that the publishers can enable, which will set the reserve price automatically.

Based on our experiments we find that ██████████████████████████████ ███████████████████████ More details about the analysis are available here.

Apart from ████████████, RTBs also receive considerable information about the query as part of the bid-request. This includes features such as - geo, city, region, time, gaia cookie id, that are used as features by RTBs to calculate their bid. Refer here for more details about dynamic bidding strategies employed by RTBs.

However as discussed above, in the current framework the reserve price for a given query depends only on the adslot that is up for auction and is therefore independent of the features of the query. i.e. we are not utilizing all the information available to RTBs in setting the reserve price. The aim of this project is to address this imbalance.

We plan to do this by implementing a system that dynamically sets the reserve price for every query based on features that are already shared with RTBs.

Comment [1]: Publisher effectively have 2 reserve prices for lots of their queries, one from ████ (third party reserve), and one from AdX. And current reserve price is maximum of the two. Do we want to align these two reserve price in this project?

Comment [2]: we only wish to touch the reserve price for adx...not the third party reserve...

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[1] This is after sanitizing the data and filtering out auctions where the largest bid was too large.

1. Greater Lift: In our experiments we find that dynamic pricing provides greater lift ███ ███████████████████████████████████

2. Simpler Seller Interface: It simplifies selling on the Adx reducing the number of knobs that the publisher needs to worry about.

3. Automatic Calibration to Market Trends: The prices are changed automatically based on changing market conditions.

4. ██ ██

The features has received its fair share of criticism and more. In this section we summarize the main objections.

1. **Lack of control:** The publishers are afraid to accept the recommendations since they have no way to analyze their impact. This might be partly responsible for the slow adoption of the current RPO recommendations and the auto updater[2]. Dynamic pricing would further exacerbate this situation.

2. **Lowering Reserve Price:** The second and possibly larger concern is that dynamic pricing might result in lowering reserve prices. Again this concern is shared with the current RPO system and may partly explain its low adoption. Further this concern is justified since the current RPO pipeline suggests lowering the reserve price on ████ of the queries. This is unacceptable since the publisher may already have a buyer (possibly in a different exchange or through a direct deal) at the given reserve price. Hence the publisher is only willing to sell for strictly more than the original reserve price. Therefore, our understanding of the reserve price during RPO, where we ignore other markets such as ████ and other exchanges, is at odds with the publisher's motivation in setting it. Concretely, in conventional RPO we view Adx as a closed system where the reserve price is used to increase revenue by ██████████. On the other hand publishers view the reserve price as a way of protecting their inventory while selling across multiple channels.

3. **First Price Auction ?:** There is some debate whether dynamic pricing is pushing us closer to a first price auction. This would be a 'PR nightmare' since we claim to have a second price auction. It might also spook some buyers and cause them to move to other exchanges.

1. ██ ██

2. ███████████████████████████████████████. ██████ ████████████████████ The

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[2] ██ ████████████████

Comment [3]: I am not sure whether this is the main reason for the low adoption rate. I guess the main reason is that we are only optimizing publisher's revenue on adx, which is a local optimum for them. We have no idea of their spending in other exchange, or even on ██

Comment [4]: ████ is right. ██████ please add this argument to the list.

Comment [5]: Sure. I guess I wasn't clear in presenting this point....

Comment [6]: Can we ask some publishers to run an AB test ████ ██ ████ am interested in the outcome.

Comment [7]: That sounds reasonable...what are the channels to do this ?

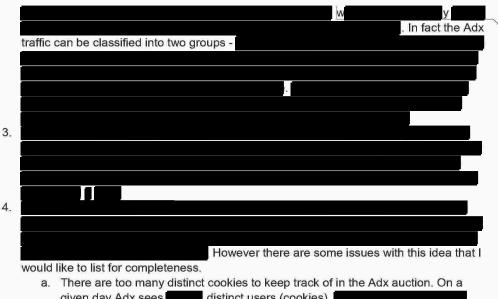**Comment [8]:** I would not worry too much about this as long as we only use information in the queries to set the reserve price.

Comment [9]: Strangely this has been the stickiest point in our discussions till date.... even though the reserve price is sent with ███ ████████████████████

Comment [10]: Can you share this analysis? How does this split by country and ad-type (video/mobile-app etc)?

Comment [11]: yes. I will share the ████████████████,as discussed offline. I haven't looked at ██████████████████

[REDACTED] w [REDACTED] y [REDACTED] . In fact the Adx traffic can be classified into two groups - [REDACTED]

[REDACTED] .

3. [REDACTED]

4. [REDACTED] However there are some issues with this idea that I would like to list for completeness.

    a. There are too many distinct cookies to keep track of in the Adx auction. On a given day Adx sees [REDACTED] distinct users (cookies). [REDACTED] .

    [REDACTED]

    b. [REDACTED]

    c. There is also the philosophical concern that this only skirts the first price auction problem by repackaging the message. The underlying idea remains the same.

Comment [12]: Is there a reasonable way to surface to the publisher that part of their inventory is really valuable?

Comment [13]: A reasonable stab at this would be to [REDACTED] not sure if this has already been considered ...

Comment [14]: This is more a practical concern. Buyers don't care what happens inside the -- to them -- black box of AdX; they care if they start paying first price versus second. Their incentives change in exactly the same way.

Comment [15]: I meant philosophical in the sense that it is no different from the arguments presented against the original (vanilla) dynamic pricing wrt first price auctions....by all means this is a practical concern